HbA1C levels in adolescent obesity, overweight and normoweight catholic high school eagles in Makassar Rajawali

Hasanuddin[1], Ilhamjaya Patellongi[2], Irfan Idris[2], and Rosdiana[2]

[1]Daya Hospital, Departemen of Nursing, University Of Islamic Macassar, South Sulawesi, Indonesia; [2]Departemen Physiology Medicine Faculty Hasanuddin University Makassar, South Sulawesi, Indonesia. Corresponding author:_hasannuru_stikesdaya@yahoo.co.id

Abstract : HbA1c Levels In Adolescent Obesity, Overweight and Normoweight Catholic High School Eagles in Makassar. Also known as glycohemoglobin or HbA1c abbreviated as A1c, is one of the important blood tests to evaluate blood sugar control. Obesity is the accumulation of adipose (adipocytes: specific fatty tissue that kept the body) to excess which is the major risk factor for diabetes. This study aims to determine differences in HbA1c levels in adolescent obesity, overweight and normoweight. The research was conducted at Catholic High School Eagles Makassar. The research was conducted with a quantitative approach and the type of study is a cross sectional study. Sampling Purposive sampling as many as 40 people and the data were analyzed with non parametric statistical test of Kruskal-Wallis and Mann-Whitney test. Research results show that there are differences in HbA1c levels in adolescent obesity, overweight and normoweight with p value of 0.007 at significance level p = 0.05. While based on Abdominal Circumference (LP) to the category of central obesity and non-obese as well there is a difference with a p value of 0.041 at significance level p = 0.05.

Key words: HbA1c, obesity

Introduction

Overweight (obesity) but can cause increased morbidity and mortality also cause a variety of degenerative diseases, such as hypertension, coronary heart disease, diabetes mellitus (DM), cancer, sleep apnea, osteoarthritis, gout, dyslipidemia, gallstones, etc. . Obesity (Overweight) is also the second leading cause of death after smoking should be prevented. If in the past, obesity is often interpreted in a healthy, prosperous, fertile, and can even increase the prestige (prestige) someone is at the present time, that perception has turned into a frightening specter for most people (Siburian, 2007).

In western countries, the incidence of obesity is very high, so it has been considered as an epidemic. Meanwhile, in developing countries like Indonesia, there is also a drastic increase in the incidence of obesity due to the influence of environmental factors and changes in lifestyle and diet are Westernized. In Indonesia alone, although no studies that standard of obesity, but the increased incidence of obesity can be found especially in big cities. From the results of research conducted in several cities in Java island found prevalence of obesity in adolescents results in Surabaya 6.5%, 5.01% Tangerang, Yogyakarta, Palembang 7.8% and 6.62%. In Jakarta the prevalence of obesity increases with age. At age 6 -12 years found obesity 4%, in adolescents 12-18 years were found obesity by 6.2% and at the age of 17-18 years of 11.4%. (Grundy S, 2004; Satoto et al., 1998). Another source said the prevalence of obesity in Indonesia are relatively high. The prevalence of obesity increased from year to year, both in developed and developing countries. In the last two decades, the prevalence of obesity has doubled in the adult population, and increased four-fold in adolescent populations (Wellen K, Hotamisligil G, 2003). According to WHO's global projections in 2005 indicated approximately 1.6 billion adults (15 years and over) are overweight and at least 400 million adults are obese. It is estimated that in 2015 approximately 2.3 billion people are overweight and more than 700 million are obese. From research in Indonesia alone, the numbers of overweight and obesity has reached 25% of the population.

Genesis DM could be detected by blood glucose levels, which are two laboratory tests recommended by the American Diabetes Association is the examination of blood glucose and HbA1c (Holman, 2008). Examination of blood glucose may reflect blood glucose levels at the time of inspection only. While HbA1c may reflect average blood glucose levels for ± 3 months (120 days) the last, according to the life span of red blood cells. Thus, the most recommended of the two examination is the examination of HbA1c (Ingle, 2008). Judging from the existing problems, and the magnitude of the risks posed,

and still lack of research on the incidence of obesity in adolescents, especially high school in Makassar, the authors are interested in doing research on the differences in HbA1c levels in adolescent obesity, overweight and normoweight Catholic High School Eagles in Makassar.

Therefore in this study the researchers intend to look at the incidence of glucose in in adolescent obesity, overweight and normoweight by looking at levels of HbA1C in Makassar Paradise Catholic Christian School

Materials and Methods

The study design used in this study were analytical approach Observational Cross Sectional Study is a study in which the independent variable (risk) and the dependent variable (effect) observed a time (Sudigdo, 2008). Where the population is Catholic high school students Eagles by using purposive sampling in getting the number of samples in this study were 40 student's are categorized as obese with abdominal circumference and central obesity ≥ 91 <91 Normal. Registered with the inclusion criteria as a Catholic high school students are actively Paradise, aged 15-18 years and able-bodied is not in pain conditions. The research was conducted by measuring body weight, using digital scales with the level of accuracy stampede 0.01 kg. Height measurement, using microtoise with 0.1 cm accuracy level. Abdominal circumference measurements using a tape measure. Students who fit the criteria the recommended fill kuesioener research to find out family history of hereditary disease on the respondents, diet and activity levels in adolescents. Furthermore, fasting is recommended at least 8 hours before performing laboratory tests by taking venous blood samples for examination and Blood Sugar Fasting insulin in adolescents in collaboration with the laboratory Prodia Makassar.

S**tatistics analysis**

This study uses a comparative analysis of over 2 groups that use the One Way ANOVA test. For normally distributed parameters were tested using One Way ANOVA, while not normally distributed parameters which will be transformed into logarithmic form. If the transformation still not normally distributed, then used a nonparametric test Kruskal Wallis.kemudian correlation test performed to determine the relations between the two variables by using lambda correlation test with significance level p <0.005

1. Characteristics of variables

Table 1. Characteristics of Respondents variable

Variabel	N	Rerata	Median	SD	Min	Maks
Age of respondens	40	16,65	16,7	0,67	15,5	18,5
Weight	40	167,03	170	12,42	103	179
Height	40	73,45	73,5	17,05	39	108
IMT	40	25,69	25,75	5,21	16,25	35,18
Abdominal circumference	40	90,50	92,00	14,72	63	119
HbA1C	40	5,47	5,5	0,29	4,8	6,1

2. Distribution of Body Mass Index (BMI), Waist Circumference (LP), and HbA1C in Adolescent Obesity, Overweight and Adolescent Normoweight.

Based on the results of the study, the distribution of body mass index category of obese adolescents with 10 (25%), the distribution of BMI categories of overweight teens with 12 (30%), distribution of body mass index category of non-obese adolescents with 18 (45%). Abdominal Circumference distribution adolescents with central obesity category 25 (62.5%), and Non-obese 15 (37.5%), the distribution of HbA1c teenagers 40 (100%). Distribution of BMI, HbA1c levels of LP and respondents can be seen in Table 2.

Table 2. Distribution of BMI, LP, HOMA-IR and Adolescent Obesity In Teens Non-obese

Variabel	N	%
IMT:		
Obesitas	10	25
Overweight	12	30
Normoweight	18	45
LP:		
Obesitas sentral	25	62,5
Non Obesitas	15	37,5
HbA1C	40	100

3. Proportion of Body Mass Index (BMI), Waist Circumference (LP) on HbA1c in Adolescent Obesity, Overweight and Normoweight.

Based on the cut-off point of this study are grouped on the subject: The level of HbA1c based on body mass index in obese category with a mean = 5.670 ± 0.2312, overweight with a mean = 5.492 ± 0.3059, non-obese with a mean = 5.333 ± 0.2376 Abdominal circumference and with central obesity categories with a mean = 5.540 ± 0.2814 and non-obese with a mean = 5.340 ± 0.2586. From the analysis using the Kruskal-Wallis test found no significant difference between levels of HbA1c in adolescent obesity, overweight and non-obese with p value of 0.007. While the results of analysis using the Mann-Withney test also found no significant difference between levels of HbA1c by Abdominal Circumference (LP) in the category of central obesity and non-obese with a p value of 0.041 (Table 3).

Tables 3. Proportion of Body Mass Index (BMI), Waist Circumference (LP) on HbA1c in Adolescent Obesity, overweight and obesity Non

Variabel	**HbA1C**		**p**
	N	**Mean+SD**	
Indeks Massa Tubuh			
Obesitas	10	5,670±0,2312	0.007
Overweight	12	5,492±0,3059	
Normoweight	18	5,333±0,2376	
Lingkar Perut			
Obesitas Sentral	25	5,540±0,2814	0.041
Normal	15	5,340±0,2586	

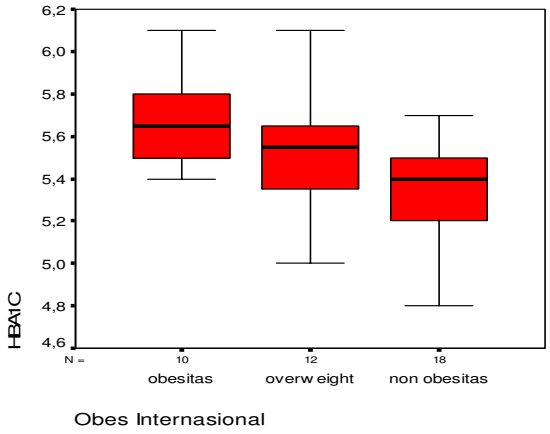

Figure 1. HbA1c based on Body Mass Index (BMI)

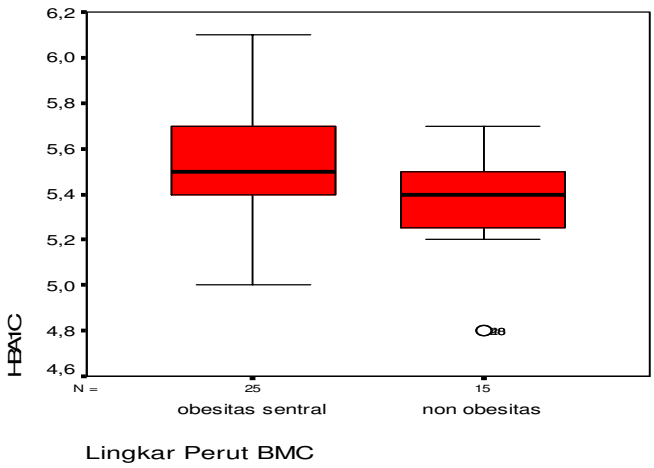

Figure 2. HbA1c based on Abdominal Circumference (LP)

Results and Discussion

Of the 40 respondents based on Body Mass Index (BMI), which consists of three categories, there were 10 or 25% of obese adolescents with a mean HbA1c level was 5.670, 12 or 30% of overweight adolescents with a mean HbA1c level was 5.492 and 18 or 45% non-obese adolescents with a mean HbA1c level was 5.333. In this study indicate that the average HbA1c levels based on Body Mass Index (BMI) in young obese men is higher than the levels of HbA1c in young men who are overweight or on the non-obese male adolescents.

Based on measurements of abdominal circumference (LP), which consists of two categories there are 25 or 62.5% of teenage boys central obesity with a mean HbA1c level was 5.540 and 15 or 37.5% of non-obese young men with a mean HbA1c level was 5.340. In this study indicate that the average HbA1c levels based on Abdominal Circumference (LP) in young men central obesity is higher than the levels of HbA1c in non-obese adolescents.

Based (Control of Diabetes Mellitus Criteria Indonesia, 2006) the average HbA1c levels through measurement based on Body Mass Index (BMI) and abdominal circumference (LP) is in the normal category (<6.5%). There are differences in mean HbA1c levels of the three categories based on the measurement of Body Mass Index (BMI) and two categories based on Abdominal Circumference (LP).

HbA1c levels inspection aims to determine the early complications that occur in people with diabetes, so it can be prevented and treated early. Measurable levels of HbA1c glucose levels will now reflect on the past 3 months (in accordance with human red blood cells age approximately 100-120 days), so that it can provide information how high glucose levels at time 3 months ago. HbA1C levels in non-diabetic normal between 4% to 6%. Several studies indicate that uncontrolled diabetes will lead to the onset of complications, for people with diabetes were at target HbA1c levels of less than 7%. The higher the HbA1C levels the higher the risk of complications, and vice versa. Diabetes Control and Complications Trial (DCCT) and United Kingdom Prospective Diabetes Study (UKPDS) revealed that the decrease in HbA1C will provide many benefits. Any decrease in HbA1C of 1% will reduce the risk of death from diabetes by 21%, 14% of heart attack, microvascular complications by 37% and 43% peripheral vascular disease (Antuna, 2000).

One mechanism to explain the relationship to an increase in blood glucose levels in obese people which resulted in HbA1c levels also increased is through an increase in body weight that can be known through the measurement of body mass index (BMI) and abdominal circumference (LP) (Liorente & Urrutia, 2006)

Conclusions

There are differences in HbA1c levels in adolescent obesity, overweight and obese non-Catholic high school in Makassar Rajawali. There are significant differences between the levels of HbA1c by Abdominal Circumference (LP) in the category of central obesity and non-obese.

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